



Case study of false alarms

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Case study of false alarms of geomagnetic storms

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Abstract: Coronal mass ejections (CMEs) are the main driver of strong geomagnetic storms. False alarms are Earth directed CMEs that do not cause a geomagnetic storm. The main reasons for false alarms are the absence of negative B_z and that the CME missed the Earth in the sense that it didn't show any signatures in solar wind data. In this study we present detailed study of both type of false alarms. Today there is no way to predict false alarms. Forecasters of space weather are of course interested in minimizing the number of false alarms. Knowledge about the causes of false alarms might help reducing the number of false alarms.

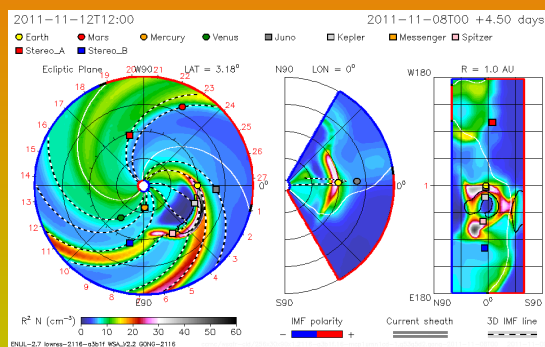
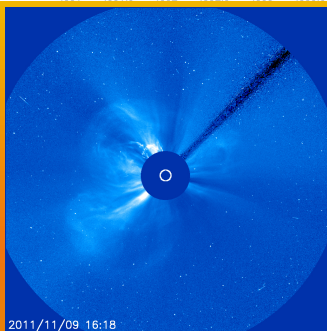
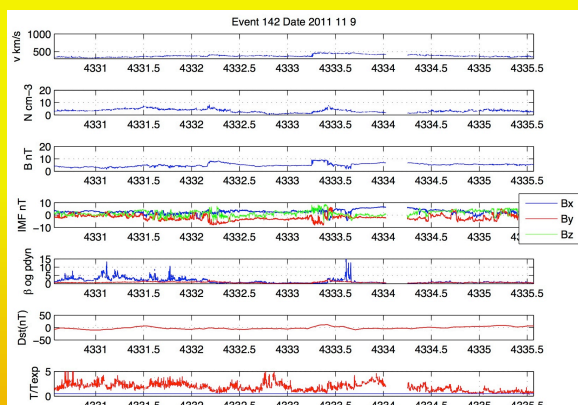
Method: A list of false alarms have been established. A false alarm is defined as:

- A front-side halo CME with speed at least 500 km/s.
- Dst index staid above -50 nT 4 days after the CME was detected on the Sun.

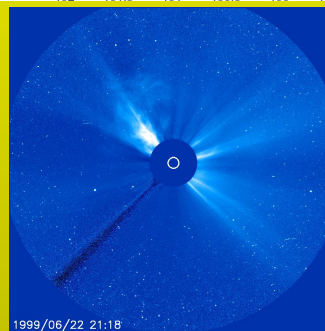
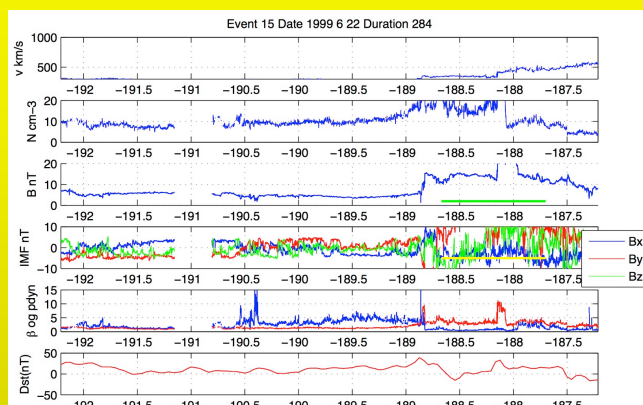
197 out of 367 of the front sided CMEs in the period 1998-2012 were false alarms.

It was found that 26% of the false alarms were miss events, in the sense that the CME did not cause any disturbance in the solar wind data. 44% were hit events in the sense that they were associated with a shock or ejecta.

Case 1: Miss event 2011/11/9



Case 2: Shock event 1999/6/22



Discussion: The main causes of false alarms of geomagnetic storms are miss events and shock events with little or no geoimpact. It has not be possible so far to find a way to predict if a front side halo CME will be false alarm or not. This is work in progress where further details on false alarms are being investigated.

Acknowledgement: We thank the CDAW for maintaining the LASCO halo CME list:

"This CME catalog is generated and maintained at the CDAW Data Center by NASA and The Catholic University of America in cooperation with the Naval Research Laboratory. SOHO is a project of international cooperation between ESA and NASA."

We also thanks CCMC for making the ENLIL model available.

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